INSTITUTE
OF COMMUNICATION,
INFORMATION
AND PERCEPTION
TECHNOLOGIES

Sant'Anna
School of Advanced Studies – Pisa

SANT'ANNA SCHOOL OF ADVANCED STUDIES – PISA is an Italian research public university with 6 Research Institutes operating in social and experimental sciences
https://www.santannapisa.it/en

It's ranked among the top 200 University according TIMES HIGHER EDUCATION WORLD UNIVERSITY RANKINGS 2019, 1st place at national level

TeCIP, Institute of Communication, Information, and Perception Technologies consists of 5.500 m² in the CNR Area of Pisa + a 1000m² Clean room for PIC manufacturing.

TeCIP is co-located with CNIT PNTLab Lab and Ericsson R&D Lab

GABRIELE CECCHETTI
gabriele.cecchetti@santannapisa.it

Main research activities, projects and collaborations

H2020 Projects

- **5G-Transformer**
  5G Mobile Transport Platform for Verticals
- **5GExchange**
  Layering of mobile 5G infrastructure services derived from LTE network
- **ICONET**
  New ICT infrastructure and reference architecture to support Operations in future PI Logistics NETworks

Other projects

- **5G-Bari-Matera** *(National 5G project)*
  Innovative services, to exploit 5G bandwidth, introduction to dynamic spectrum sharing by the means of virtualization and network slicing.

Relevant papers related to railways

***WCRR**, IEEE Trans. Industrial Informatics, IEEE MT-ITS, IEEE CloudNet, IARIA Mobility, ICREM*

Railways activities and collaborations

- **Safety Radio System for faster and more efficient rail traffic circulation**
  (SR-SECURE, National project)
  - *Radio InFill System to make more secure and more efficient the train circulation*
  - **Development of full EURORADIO software stack**
- **RFI** *(trackside Italian operator)*
  collaboration about:
  - Improved Backbone networks
  - Wireless link as a redundant connection for backup purposes in the case of failure of the wired link
  - Energy harvesting for trackside
- **TRENITALIA** *(onboard Italian operator)*
  collaboration about:
  - On board wireless network and sensors
  - Redefining the architecture of the train on-board network

TeCIP Institute main knowledge and experience related to Shift2Rail Open Call 2019

- Definition of specifications, design, and implementation of **data centers**, **computer systems**, **information systems** and **cyber security** (***IP2-02***)
- Definition of specification, design, implementation, assessment of **network infrastructure** (core and edge), **availability analysis** and **communication systems** (***IP2-02***, ***IP5-01***, ***IP5-02***)
- Analysis and evaluation of trackside and onboard **railways systems**, with special regard to **energy harvesting systems** (***IP-03***)
- Design and development of algorithms and **information systems**, with particular attention to **interoperability aspects** (***IP-04***)
- Being an **academic institution with accredited PhD programs**, SSSA can be the natural **host** and/or **tutor** of the PhD researchers enrolled for studying Artificial Intelligence for railways sector (***IPX-01***)

S2R Open Call 2019 SSSA interest

IP2-01: Demonstrator development for the use of Formal Methods in railway environment - Support to implementation of CSIRT to the railway sector

SSSA could participate as partner in the implementation of CSIRT and of the CSIRT collaborative environment.

IP2-02: Support to development of demonstrator platform for Traffic Management

SSSA could participate as coordinator or partner in the requirements definition of the communication platform and in its design. Moreover it could participate in the experimentation of the demonstrator bringing a unified vision.

IP3-01: Future traction power supply for railways and public transport

SSSA could participate as partner in study and analysis of the state of art and best practices and in the definition of performance target and specifications.

IP4-01: Complementary Travel Expert Services

SSSA could participate as partner in the development of algorithms and in the implementation of proof of concepts

IP5-01: Condition-based and preventive maintenance for locomotive bogie

SSSA proposes its participation as partner on the design and implementation of the sensors and communications boxes, of the monitoring system and of the related information system.

IP5-02: Advanced obstacle detection and track intrusion system for autonomous freight train

SSSA proposes its participation as partner on the design and implementation of the communications infrastructure of the monitoring system.

IPX-01: Artificial Intelligence (A.I.) for the railway sector

SSSA could participate as coordinator or partner in the study, analysis of the state of art of the A.I. technique suitable to be applied to the rail sector.

TeCIP Institute@SSSA is a strong research institution that can be a partner for railways projects related to:

- Trackside and onboard railways systems
- Signaling systems and protocols
- Communication and network systems
- Sensors and wireless systems
- Datacenter and cybersecurity
- Information systems
- PhD programs

http://tecip.santannapisa.it/en
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thank you!

email: **gabriele.cecchetti@santannapisa.it**